WHAT IS CLAIMED IS:

1. A router comprising:

a plurality of line cards each operable to receive at least one packet comprising an identifier associated with a destination element external to the router, each line card comprising a look-up table operable to facilitate routing the received packet toward the destination element based at least in part on the identifier;

a plurality of optical transmitters each associated with one of the line cards and operable to generate at a specified wavelength an optical router signal comprising at least a portion of the packet received by the line card associated with that optical transmitter; and

a star switching fabric operable to receive a plurality of optical router signals from the plurality of optical transmitters and to communicate to each of a plurality of tunable filters a substantially similar set of at least some of the plurality of optical router signals;

wherein each of the plurality of tunable filters is operable to selectively tune to a wavelength of one of the plurality of optical router signals to facilitate communication of the packet associated with that optical router signal toward the destination element.

2. The router of Claim 1, wherein at least one of the plurality of optical transmitters comprises a fixed wavelength optical transmitter.

3. The router of Claim 2, wherein the use of fixed wavelength optical transmitters comprises a primary mechanism for reducing collisions within the switching fabric.

4. The router of Claim 1, wherein the tunable filter comprises a Fabry Perot based interferometric device.

5. The router of Claim 4, wherein the tunable filter comprises a micro-electromechanical switching (MEMS) device.

6. The router of Claim 5, wherein the tunable filter is operable to tune to a selected wavelength in less than 10 microseconds.

7. The router of Claim 5, wherein the tunable filter is operable to tune to a selected wavelength in less than 1 microsecond.

8. The router of Claim 5, wherein the tunable filter is operable to tune to a selected wavelength in less than 100 nanoseconds.

9. The router of Claim 1, wherein each of the plurality of tunable filters is associated with one of the plurality of line cards and wherein at least one of the plurality of tunable filters resides externally to its associated line card.

10. The router of Claim 9, wherein the at least one of the plurality of tunable filters is coupled to the star switching fabric using a planar waveguide.

11. The router of Claim 1, wherein each of the plurality of tunable filters is associated with one of the plurality of line cards, and wherein each of the plurality of optical transmitters and each of the plurality of tunable filters resides on its associated line card.

12. The router of Claim 1, wherein at least some of the plurality of line cards reside in a first location and at least some of the plurality of line cards reside in a second location spatially separated from the first location and coupled to the first location through the star switching fabric.

13. The router of Claim 12, wherein the first location and the second location each comprises a separate rack of line cards.

14. The router of Claim 1, wherein the router is operable to communicate the optical routing signals from the optical transmitters to the tunable filters without converting the optical routing signals to an electronic form between the optical transmitters and the tunable filters.

15. The router of Claim 1, wherein the packet comprises an Internet Protocol (IP) packet or a Transmission Control Protocol (TCP) packet.

16. The router of Claim 1, wherein the packet comprises a Multi-Protocol Label Switching (MPLS) or a Generalized Multi-Protocol Label Switching (GMPLS) packet.

17. The router of Claim 1, wherein the identifier comprises an address or a tag identifying an element external to the router to which information in the packet is destined.

18. The router of Claim 1, further comprising control circuitry operable to generate a control signal based at least in part on an identifier associated with one of the packets and to communicate the control signal to at least one of the tunable filters to cause that tunable filter to tune to a selected wavelength associated with one of the optical router signals.

19. The router of Claim 18, wherein the control circuitry comprises, for each line card, a processor coupled to the tunable filter by an Ethernet.

20. The router of Claim 19, wherein the control circuitry comprises a controller operable to receive the control signal from the processor and to determine a schedule for communicating the control signal to a selected tunable filter.

21. The router of Claim 18, wherein the control signal received from the processor identifies an output optical link in a path to the destination element, and wherein the controller is operable to identify the selected filter associated with the output optical link based on the control signal.

22. The router of Claim 18, wherein the control circuitry comprises a plurality of control optical transmitters, each associated with one of the line cards and each operable to generate an optical control signal for communication to the plurality of tunable filters through the star switching fabric.

23. The router of Claim 1, wherein the router is operable to facilitate multicast or broadcast operation by tuning multiple of the plurality of filters to the same selected wavelength.

24. The router of Claim 1, further comprising an optical-to-electrical converter coupled to the tunable filter and operable to facilitate electronic processing of the optical signal received from the tunable filter.

25. The router of Claim 1, wherein the star switching fabric comprises a signal divider operable to receive a multiple wavelength signal and to communicate the multiple wavelength signal to a plurality of output paths from the star switching fabric.

26. The router of Claim 25, wherein the signal divider comprises a cascade of 1xn optical couplers.

27. The router of Claim 25, wherein the signal divider comprises a power divider.

28. The router of Claim 25, wherein the star switching fabric comprises a signal combiner operable to combine a plurality of wavelength signals into the multiple wavelength signal and to communicate the multiple wavelength signal to the signal divider.

29. The router of Claim 25, wherein the signal divider is coupled to an optical amplifier operable to amplify the multiple wavelength signal to at least partially compensate for a loss associated with the signal divider.

30. The router of Claim 1, wherein at least some of the plurality of optical transmitters each comprise:

a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal;

wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength.

31. The router of Claim 30, wherein the common bay equipment comprises:

a modelocked pulse source operable to generate a plurality of optical pulses;

a continuum generator operable to broaden the spectrum of the plurality of optical pulses into an approximate spectral continuum of optical pulses; and

a signal splitter operable to generate from the approximate continuum the plurality of unmodulated optical signals each comprising a center wavelength.

32. A line card for use in a router and operable to receive a packet comprising an identifier associated with a destination element external to the router, the line card comprising:

a look-up table operable to facilitate generation of a control signal based at least in part on the identifier;

an optical transmitter operable to generate an optical router signal comprising at least a portion of the packet at a particular wavelength, the optical transmitter further operable to communicate the optical router signal to a star switching fabric; and

a tunable filter operable to receive at least a portion of a plurality of optical router signals from the star switching fabric and to accept a selected optical router signal by tuning, in response to a control signal generated by another line card, to a wavelength associated with the selected optical router signal.

33. The line card of Claim 32, wherein the optical transmitter comprises a fixed wavelength optical transmitter.

34. The line card of Claim 33, wherein the optical transmitter comprises an integrated modulator.

35. The line card of Claim 32, wherein the control signal comprises an electronic control signal operable to be communicated to the tunable filter over an Ethernet.

36. The line card of Claim 32, wherein in the control signal comprises an optical control signal operable to be communicated to the tunable filter through the star switching fabric.

37. The line card of Claim 32, wherein the optical transmitter comprises:

a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal;

wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength.

38. A router comprising:

a first plurality of line cards residing in a first rack;

a second plurality of line cards residing in a second rack physically separate from the first rack, wherein each of the line cards of the first and second pluralities of line cards comprises an optical transmitter operable to generate at a specified wavelength an optical router signal;

a star switching fabric operable to receive a plurality of optical router signals from the plurality of optical transmitters and to communicate substantially similar sets of optical router signals to each of a plurality of tunable filters, each tunable filter associated with one of the line cards and operable to selectively tune to a wavelength of one of the plurality of optical router signals received;

wherein the star switching fabric operates as a switching fabric and as an interconnect between the racks of line cards and wherein the router is operable to communicate an optical routing signal from an optical transmitter residing in the first rack to a tunable filter residing in the second rack without converting the optical routing signal to an electronic form between the optical transmitter and the tunable filter.

39. The router of Claim 38, wherein at least one of the optical transmitters residing on the first or second plurality of line cards comprises a fixed wavelength optical transmitter.

40. The router of Claim 38, wherein at least one of the plurality of tunable filters resides externally to its associated line card.

41. The router of Claim 38, wherein each of the plurality of tunable filters resides on its associated line card.

42. The router of Claim 38, wherein at least one of the optical transmitters residing on the first or second plurality of line cards comprises:

a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal;

wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength.

43. A router comprising:

a plurality of line cards each operable to receive at least one packet comprising an identifier associated with a destination element external to the router,

a plurality of optical transmitters each associated with one of the line cards and operable to generate at a specified wavelength an optical router signal comprising at least a portion of the packet received by the associated the line card;

a star switching fabric operable to receive a plurality of optical router signals from at least some of the plurality of optical transmitters and to communicate substantially similar sets of optical router signals to each of a plurality of tunable filters integral to the switching fabric, wherein each filter is associated with a separate output optical link and each filter is operable to selectively tune to a wavelength of one of the plurality of optical router signals to facilitate communication of the packet associated with that optical router signal from that filter toward a destination element associated with that packet.

44. The router of Claim 43, wherein at least one of the plurality of optical transmitters comprises a fixed wavelength optical transmitter.

45. The router of Claim 43, wherein at least one of the plurality of optical transmitters resides externally to its associated line card.

46. The router of Claim 43, wherein at least one of the plurality of optical transmitters comprises:

a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal;

wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength.

47. The router of Claim 43, wherein the packet comprises an Internet Protocol (IP) packet or a Transmission Control Protocol (TCP) packet.

48. The router of Claim 43, wherein the packet comprises a Multi-Protocol Label Switching (MPLS) or a Generalized Multi-Protocol Label Switching (GMPLS) packet.

49. A switching core for use in a router, the switching core comprising:

a star switching fabric operable to receive a plurality of input optical router signals each comprising a different wavelength, at least some optical router signals carrying a packet associated with a destination element external to the router, wherein the star coupler is operable to generate a plurality of output optical router signals each comprising a substantially similar set of at least some of the plurality of input optical router signals; and

a plurality of tunable filters coupled to the star switching fabric, each tunable filter associated with a line card and operable to receive one of the output optical router signals and to select a portion of the output optical router signal by tuning to a wavelength of the selected portion of the output optical router signal, wherein each tunable filter is coupled to its associated line card through a multi-mode fiber.

50. The switching core of Claim 49, wherein at least one of the plurality of input optical router signals is generated by a fixed wavelength optical transmitter within the router.

51. The switching core of Claim 49, wherein the packet comprises an Internet Protocol (IP) packet or a Transmission Control Protocol (TCP) packet.

52. The switching core of Claim 49, wherein the packet comprises a Multi-Protocol Label Switching (MPLS) or a Generalized Multi-Protocol Label Switching (GMPLS) packet.

53. The switching core of Claim 49, wherein the star switching fabric comprises a signal divider operable to receive a multiple wavelength signal and to communicate the multiple wavelength signal to a plurality of output paths from the star switching fabric.

54. The switching core of Claim 53, wherein the signal divider comprises a cascade of 1xn optical couplers.

55. The switching core of Claim 53, wherein the signal divider comprises a power divider.

56. The switching core of Claim 53, wherein the star switching fabric comprises a signal combiner operable to combine a plurality of wavelength signals into the multiple wavelength signal and to communicate the multiple wavelength signal to the signal divider.

57. The switching core of Claim 53, wherein the signal divider is coupled to an optical amplifier operable to amplify the multiple wavelength signal to at least partially compensate for a loss associated with the signal divider.

58. A switching core for use in a router, the switching core comprising:

a signal combiner operable to combine a plurality of wavelength signals into a multiple wavelength signal;

an optical amplifier operable to receive and amplify the multiple wavelength signal;

a signal divider operable to receive a multiple wavelength signal and to communicate the multiple wavelength signal toward a plurality filters, each filter associated with an output link from the router and operable to pass a particular wavelength signal of the multiple wavelength signal while rejecting at least some of the other wavelengths of the multiple wavelength signal.

59. The switching core of Claim 58, wherein the signal combiner comprises a wavelength division multiplexer.

60. The switching core of Claim 58, wherein the signal divider comprises a cascade of 1xn optical couplers.

61. The switching core of Claim 58, wherein the signal divider comprises a power splitter.

62. The switching core of Claim 58, wherein at least some of the filters comprise tunable filters operable to select a portion of the multiple wavelength signal for further transmission by tuning to a wavelength of the selected portion of the multiple wavelength signal.

63. The switching core of Claim 58, wherein the plurality of wavelength signals received by the signal combiner comprise optical signals generated by tunable optical transmitters.

64. A router, comprising:

a plurality of line cards each operable to receive at least one Multiple Protocol Label Switching (MPLS) or Generalized Multiple Protocol Label Switching (GMPLS) packet, each line card operable to perform label switching to facilitate routing the received packet toward a destination element;

a plurality of optical transmitters each associated with one of the line cards and operable to generate at a particular wavelength an optical router signal comprising at least a portion of the packet received by the line card associated with that optical transmitter; and

a star switching fabric operable to receive a plurality of optical router signals from the plurality of optical transmitters and to communicate a substantially similar set of optical router signals to each of a plurality of filters, each filter associated with a separate output link from the router and operable to pass a particular wavelength toward the associated output link from the router.

65. The router of Claim 64, wherein each of the optical transmitters comprises a tunable transmitter operable to selectively tune to a wavelength passed by a selected one of the plurality of filters coupled to a desired output link from the router.

66. The router of Claim 64, wherein at least one of the plurality of optical transmitters comprises:

a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal;

wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength.

67. The router of Claim 64, wherein each of the plurality of filters comprises a tunable filter operable to selectively tune to a wavelength of a particular optical router signal destined for transmission from the associated output link.

68. The router of Claim 67, wherein at least one of the optical transmitters comprises a fixed wavelength optical transmitter.

69. The router of Claim 64, wherein at least one of the plurality of filters resides externally to all of the line cards.

70. The router of Claim 64, wherein each of the plurality of filters resides on a respective one of the plurality of line cards that is coupled to the optical output link associated with that filter.

71. In a router comprising a plurality of line cards coupled to a star switching fabric, a method of routing optical signals, comprising:

receiving at a first line card a first packet comprising an identifier of a destination element external to the router;

applying the identifier to a look-up table on the first line card to determine a control signal;

communicating the first packet to a star switching fabric in an optical format having a first wavelength;

communicating from the star switching fabric to a plurality of tunable filters each associated with a separate output link from the router, the first packet and at least a second packet comprising an optical format having a second wavelength;

communicating the control signal to a selected tunable filter associated with a communication path to the destination element, the control signal operable to cause the selected tunable filter to accept the first packet and to facilitate communicating the first packet toward the destination element.

72. The method of Claim 71, wherein receiving at a first line card a first packet and applying the identifier to a look-up table comprise:

receiving at the first line card an optical input signal comprising the first packet;

converting at least the identifier portion of the first packet to an electronic format; and

applying the electronic identifier portion of the first packet to a look-up table on the first line card.

73. The method of Claim 71, wherein communicating the first packet to a star switching fabric in an optical format having a first wavelength comprises:

generating a first optical signal comprising the first packet using a fixed wavelength optical transmitter operable to generate optical signals at approximately the first wavelength.

74. The method of Claim 73, wherein the look-up table and the fixed optical transmitter reside on the first line card.

75. The method of Claim 71, wherein communicating the first packet to a star switching fabric in an optical format having a first wavelength comprises:

receiving an unmodulated optical signal having the first wavelength from common bay equipment operable to generate a plurality of unmodulated optical signals each having a center wavelength;

modulating information onto the unmodulated optical signal; and

communicating the modulated optical signal to the star coupler.

76. The method of Claim 71, wherein the first packet comprises an Internet Protocol (IP) packet or a Transmission Control Protocol (TCP) packet and wherein the identifier comprises an address identifying the network element external to the router.

77. The method of Claim 71, wherein the first packet comprises a Multi-Protocol Label Switching (MPLS) packet or a Generalized Multi-Protocol Label Switching (GMPLS) packet and wherein the identifier comprises a tag identifying the network element external to the router.

78. The method of Claim 71, wherein the optical wavelength filter comprises a Fabry Perot interferometric device.

79. The method of Claim 78, wherein the optical wavelength filter comprises a micro-electromechanical switch (MEMS) device.

80. The method of Claim 79, wherein the optical wavelength filter is operable to tune to a selected wavelength in less than 10 microseconds.

81. The method of Claim 79, wherein the optical wavelength filter is operable to tune to a selected wavelength in less than 1 microsecond.

82. The method of Claim 79, wherein the optical wavelength filter is operable to tune to a selected wavelength in less than 100 nanoseconds.

83. The method of Claim 71, wherein the selected tunable filter resides on a second line card coupled to the star switching fabric.

84. The method of Claim 71, wherein the selected tunable filter is associated with a second line card and resides remote from the second line card.

85. The method of Claim 71, wherein communicating the first packet to the star switching fabric and communicating the first and second packets from the star switching fabric to a plurality of tunable filters comprises:

communicating the first packet from the first line card to the selected tunable filter without converting the first packet from an optical to an electrical format between the first line card and the selected tunable filter.

86. The method of Claim 71, wherein communicating the control signal to a selected tunable filter comprises communicating an electronic control signal over an Ethernet to the selected tunable filter.

87. The method of Claim 71, wherein communicating the control signal to a selected tunable filter comprises communicating an optical control signal through the star switching fabric to the selected tunable filter.

88. The method of Claim 71, wherein the identifier comprises an identification of a plurality of destination elements, wherein the destination element comprises a first destination element, and wherein the selected tunable filter comprises a first selected tunable filter, and further comprising:

communicating the control signal to a second selected tunable filter associated with a communication path to a second destination element, the control signal operable to cause the second selected tunable filter to accept the first packet and to facilitate communicating the first packet toward the second destination element.